

Dr. Gresswell's Report to the Local Government Board  
on the Sanitary State of the Aylesbury Urban Sanitary District; and on Diphtheria there.

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GEORGE BUCHANAN,  
Medical Department,  
July 15, 1886.

The Urban Sanitary District of Aylesbury is coterminous with the parish of the same name; it covers an area of 3,200 acres, and has a population estimated, to the middle of 1885, at 8,087. Most of these persons reside in the town of Aylesbury, which, built on the summit and slopes of an eminence, overlooks in all directions the rich grazing land of Aylesbury Vale. The trend of this Vale is westward; to the north rise the Whitchurch, Pitchcot, Quainton, and Waddesdon Hills; to the south rise the Chiltern Hills; eastward is Hertfordshire, and westward is Oxfordshire. Several rivulets (some north and some south of Aylesbury) drain the Vale; flowing westward they unite towards Ethrope (two miles to the west of Aylesbury) to form the river Thame.

The summit of the eminence upon which the central parts of the town stand is some 300 feet above sea level. It consists of Portland stone and sand, while the slopes of this eminence and the lands extending north, west, and east of the town are formed of Kimmeridge clay, overlaid by a rich dark mould. South-eastwards there appear in succession outcrops of Portland stone, Gault, Upper greensand, and Chalk; the latter rising to a considerable height as the Chiltern Hills.

Various factories in and near the town afford occupation to a large number of hands; but pillow-lace making has now almost disappeared from the town and surrounding district. The Vale is given up in chief part to pasturage.

The town of Aylesbury is in its older and central parts closely and irregularly built. Many of the public streets are very narrow, and they are badly kept. Private streets, which are numerous, are commonly not levelled or drained, and in wet weather (as at date of inspection) they are covered with clay mud to a depth in some instances of half a foot. The Local Board have, however, taken action in reference to some of these streets under section 150 of the Public Health Act, 1875, and they propose to deal in like fashion with the rest of them. Houses without any curtilage whatever, and others extremely limited in this matter, are met with in great numbers. Ground surfaces around dwellings are generally not sloped to allow of ready surface drainage. Old cottage dwellings are very dilapidated, and not a few of them are wholly unfit for habitation. Ashbins are all but non-existent, and large quantities of festering house refuse are commonly found in the proximity of dwellings. Scavenging is undertaken by the Local Board, but is not efficiently carried out; indeed, the limited curtilage appertaining to many houses is thickly covered in some parts of the town (*e.g.*, Silver Lane and Spring Gardens) with refuse which must have been accumulating for very many months. Buckingham Arms Yard and Bull's Head Alley too, with other places, are in a most filthy condition. Indoor sinks discharging directly into house drains or over bell-traps in the floors of kitchens are frequently met with. Some houses are unprovided with means for disposal of slops. Excrement disposal is mainly by water-closets, 1,200 of the 1,650 houses of the district being, it is said, provided with them; but in many instances one closet serves for three or four houses. A large number of the water-closets are indoor closets, and these, like the rest, are, generally speaking, inadequately ventilated. In by far the majority of cases closets have not had water laid on to them, so that flushing of them must be done by hand. As a result closet pans are commonly in a foul state,



and many of them are full of filth to overflowing. The closet soil pipe is only exceptionally ventilated. Some of the privy vaults, which still exist in the town, overflow through brick midfeather traps into the public sewers. House drains discharge directly into the sewers without intervention of traps, and they are scarcely ever ventilated. In all probability the majority of the old house drains are of brick: however this may be, many of them are seriously defective, for rats in houses and stench from cupboards and floorings are frequently heard of.

A constant water service has been afforded to the town since 1867 by the Chiltern Hills Water Company, which also supplies Tring and many villages hereabout. The Company's waterworks are at the summit of the Aston Clinton Hills. The water, obtained from a deep well with extensive adits, and a bore driven deep into the chalk, is hard, but it is softened by Clark's process prior to being served. It is supplied, constantly and at high pressure, mainly to stand pipes; between August 1884 and June 1885 it was supplied, however, for only 6 hours out of the 24, a severe drought having told upon the amount of water in the chalk. This public water service has not yet been universally adopted, 40 or more private wells being still in use in the town.

A sum of 25,000*l.* has been spent, I am told, on sewerage works. All the streets, except some which are private, are now sewered, and most of them have been sewered since 1870. All the sewage (save only that of two short outlying streets, which is separately dealt with) passes ultimately by two main sewers to one outfall, where works have been constructed for treating it on the A B C process. These works are managed by the Native Guano Company, to whom the Local Board pay an annual subsidy of 250*l.* The sewers are in part old; in larger part they are of comparatively recent construction. It is, however, especially the peripheral part of the sewerage system that is new, for the sewers of all the central parts of the town are old culverts. These culverts are admittedly of faulty construction, and their fall in particular instances is known to be bad. Their defects have been for some time under consideration by the Authority: and in place of one of them a new sewer, well constructed and efficiently provided with means for ventilation and flushing, has been quite recently laid down. One half of the new sewers consists of 9-inch, 12-inch, and 15-inch cemented and socketed glazed pipes, and the other half is of brick, and has an oval section. The old sewers are not provided with any flushing appliance, and portions only of the new sewers are so provided. The old culverts are destitute of proper means of ventilation, though they have as many as 18 dead ends in the central third, the highest and the most closely built part of the town. The new sewers are provided with manholes and surface ventilators, but most of the latter are choked with road débris; accidentally, perhaps, in some instances, but often purposely by persons who live near them, so offensive are they universally considered. Further, in the course of the new sewers there are, I am told, two large catchpits (10 feet by 3 feet and 1½ feet deep). The contents of these catchpits are removed, from time to time, to a place only a few paces to the rear of several houses in Bierton Road, where they give rise to nuisance.

For a reason which will appear later on the schools of Aylesbury require special mention. The average attendance of children at the public schools of the place reached 1,107 last year; 384 attended the British School, 231 the St. Mary's National School, 206 the St. John's National School, 130 the Free Grammar School, and 156 the Walton School. Of these schools the British and the Free Grammar School stand on Portland stone at the highest part of the town. The other schools stand at a lower elevation on clay soil. Schoolrooms, almost without exception, are inefficiently ventilated. Roof and gable outlets for vitiated air are commonly provided, but, except in a few instances, there is no proper contrivance for admitting fresh air to the schoolrooms. Certain floor grids intended to allow entrance of air into the rooms from chambers under the floor which are in communication with the external air, were none of them acting at the time of my visits; either the grids had been closed, or the space immediately beneath them had become choked with floor refuse. At the Walton School these air-spaces beneath the floor





had evidently been intentionally made use of as receptacles for such refuse for some long continued period. Excrement disposal at the schools is provided for in water-closets, but prior to the outbreak of diphtheria at no school were the soil pipes ventilated, or the closet pans flushed otherwise than by bucket. At the British Schools the closet for 230 children (138 girls and 92 infants) is within the school building, and it is entered by a doorway directly facing, and but one pace removed from, the door of the infants' schoolroom. This closet is combined with a lavatory and urinal, and, prior to the outbreak of diphtheria, the closet pans were inadequately flushed, and the drain-inlet that constituted the urinal and over which the lavatory-pipe discharged was inadequately trapped. Further, the urinal and lavatory drain, which was itself unventilated, discharged into an old non-ventilated culvert at the very highest part of the town. Stench from this closet had pervaded the school building and had been matter of common and repeated complaint.

Occurrence of infectious disease is not notified on the part of medical practitioners to the Medical Officer of Health, and deaths are notified to him by the Registrar only at weekly intervals. Standing means for isolation of infectious cases has, in a fashion, been provided; but the structure, which goes by the name of the isolation hospital, cannot be regarded as more than provisional. It was erected at a time of prevalence of small-pox.

It is constructed of corrugated iron, lined inside by matchwood, and consists of three small rooms under one roof; a nurse's room with a ward on either side, each of which wards is available for two patients. A water-closet, without any intervening cross ventilated space, is attached to each ward. The soil pipes of these closets are not ventilated, and they discharge into an open cesspool which at the time of inspection was full of water. The site of the hospital is not well chosen, and the basement and surrounding land have not, so far as I can learn, been adequately drained.

The sanitary administration of the district is conducted by a Local Board of nine members. Mr. C. Hooper has been Medical Officer of Health under Order of the Board since 1881, at a yearly salary of 70*l.* Mr. G. Cannon, also under the Board's Order, has been Inspector of Nuisances for about a year at a salary also of 70*l.*, while as surveyor he receives a further sum of 34*l.* per annum. Mr. Cannon has made a careful house-to-house inspection of the district, with the result of discovering abundance of nuisances and sanitary shortcomings. Some of these, or indeed most of them, had already been reported by the Medical Officer of Health to the Local Board, and had come, moreover, under the notice of the previous Inspector of Nuisances; but it is only now that adequate action is being taken in regard of them.

Byelaws dealing with new streets and buildings, with nuisances, and with common lodging-houses, were confirmed by the Local Government Board in 1884. Others relating to slaughter-houses are of older date and were not based on the Board's model; some of the slaughter-houses give rise to much nuisance owing to their proximity to inhabited houses, and one of those which I inspected was in an offensive condition. Common lodging-houses have not as yet been fully regulated by the Authority; the bedrooms of those which I visited were seriously deficient in light and ventilation. The byelaws relating to new buildings have not been fully enforced, and it would seem that the attention of the Authority needs to be directed to the necessity for strict compliance with their provisions.

Several of the bakehouses, which number 17 in all, are ill adapted for their purpose, being cramped, dark, badly ventilated, and badly situated. Some are in close proximity to defective drains; and one is in a cellar, in the floor of which is a bell-trapped inlet into the house drain. This drain, which receives privy soil, runs at a short depth below the bakehouse floor throughout its whole extent.

Dairies are all registered. It is said that milk is plentiful and cheap. The townsfolk obtain milk from some dozen cow keepers, who retail milk of their own cows in and about the town.

Certain vital statistics for the urban sanitary district, *i.e.*, for the parish of Aylesbury, prepared by the Medical Officer of Health, are subjoined. In regard of them it should be said that corrections have been made for extra-parochial deaths in the gaol, the workhouse, and the county infirmary.



Year.	Rates per 1,000 of the Population.				Deaths under 1 Year of Age per 1,000 registered Births.
	Birth-rate.	Death-rate.	Zymotic death-rate.	Death-rate from Pneumonia, Pleurisy, and Phthisis.	
1881 - -	28·9	14·8	1·2	3·5	88·4
1882 - -	33·0	20·5	4·5	4·5	120·1
1883 - -	30·8	18·2	2·2	4·3	138·2
1884 - -	28·0	17·3	2·7	2·7	137·1
1885 - -	34·1	18·4	3·2	3·2	101·4

It should be noted that cases—not imported—of enteric fever, though much rarer since the town was supplied by the Chiltern Hill water, still occur from time to time in the town; there were two deaths registered to it in 1883, one in 1884, and one again in 1885. Of deaths from diarrhoea there were five in 1883 and 10 in 1884; in 1885, however, there was but a single death from this cause.

Certain meteorological data for 1884 and 1885, prepared by Mr. Geo. Copcutt, are appended:—

—		January.	Feb- ruary.	March.	April.	May.	June.
Inches of rainfall in Aylesbury in 1884	-	1·8	0·8	1·2	1·2	0·7	2·2
„ „ „ 1885	-	2·0	2·1	1·6	1·6	2·5	2·0

(continued.)

—		July.	August.	Sep- tember.	October.	Novem- ber.	Decem- ber.
Inches of rainfall in Aylesbury in 1884	-	2·6	2·7	1·7	1·7	1·4	3·1
„ „ „ 1885	-	0·4	2·0	3·8	5·1	4·9	0·7

The mean temperature for 1884 was 55·7° F.; that for 1885 was 52·9° F.

#### PREVALENCE OF DIPHTHERIA.

*General history.*—Diphtheria, as cause of death, in Aylesbury as also in the registration district to which Aylesbury belongs was first registered in 1858, and from the beginning of that year up to the present time the number of deaths registered to diphtheria in the whole of the registration district has been 79. These deaths were distributed thus: 31 in the six years 1858 to 1863, 1 in 1869, 4 in 1870, 3 in 1878, 6 in 1879, 6 in 1882, 4 in 1883, 3 in 1884, 15 in 1885, and 6 during the first eight weeks of 1886. But these numbers by no means represent the actual mortality from this class of disease when such affections as croup and various fatal throat maladies are taken into account. Indeed, no year since 1858 has been without such a death, and, with exception of two years, the same is true of the single parish, the urban sanitary district of Aylesbury. In certain years there have been as many as 20 and more deaths from one or other affection of this sort in the registration district.



In this urban district there was not in 1880 any death from diphtheria or (it would seem) from any affection allied thereto. In succeeding years the following deaths were registered: in 1881, 1 from diphtheria and 4 from croup; in 1882, 5 from diphtheria; in 1883, 1 from diphtheria; in 1884, 4 from croup and 1 from acute laryngitis; in 1885, 15 from diphtheria, 1 from croup, and 1 from acute laryngitis; and during the first eight weeks of 1886 three from diphtheria. There is reason for supposing that a death registered to malignant scarlet fever in 1885 and another in the same house so registered in 1886 were of a diphtheritic nature.

*Recent prevalence.*—It is generally considered by the medical practitioners of the district that Aylesbury had, for several months prior to the recent outbreak, been free from diphtheria and diseases for which it might have been mistaken. The first case in this outbreak is regarded by all as having occurred in the person of Flory R—— aged five years, who was taken ill with diphtheria on October 18th, 1885. And after making detailed inquiry of the clergy, and of the various schoolmasters and mistresses (both of private and public establishments), I failed to hear of any acute case of diphtheria in the district for several consecutive months immediately preceding the attack of this child. But I did learn, as will presently appear, of a considerable prevalence of what was regarded as simple sore-throat antecedent to the diphtheria outbreak. Between October 18th, 1885 (date of attack of Flory R——), and February 24th, 1886, there were at least 37 households invaded by diphtheria, including that in which the cases of “malignant scarlet fever” occurred. These households comprised a population of 225, and of this number 92 were affected less or more by diphtheria, and 20 of the 92 died.

I say advisedly “at least 37,” for during my personal inquiries I met with several instances of true diphtheria, which had not, up to that time, been heard of. For instance, at one school I met with a lad suffering from the paralytic sequelæ of diphtheria, but neither he, nor his master, or either of his parents was aware that he had suffered from anything more than a slight cold. Nevertheless, I failed to find any acute case of date shortly antecedent to that of attack of Flory R——.

The diphtheria has fallen especially upon and has been especially fatal among persons of age varying from 1 to 15 years. I met with no case of infection, (though even slight enlargement of the cervical glands would have been admitted as evidence of it), among babes under six months of age, though many of this age had been living for weeks in the midst of infected persons and things. Attacks of diphtheria in persons above the age of 15 years have been for the most part of a trivial nature, and the age at death has in no instance exceeded 14 years.

In regard of sex, it may be noted that of the persons first affected in 37 households, 20 were males and 17 females.

The disease has prevailed especially among the poor, but it has not been confined to them.

Proceeding to differentiate among factors which may be thought of as having had concern with the recent epidemicity of diphtheria, it would appear that milk, and water also, must be acquitted of having disseminated the disease. As to milk, the first 10 households invaded got their milk from as many different milk sellers, who distributed milk of their own cows and who had no dealings with one another; while in reference to water a somewhat larger incidence, in the town, of diphtheria on consumers of Chiltern Hill water than on consumers of well water was seen to be of little account, due regard being had to the total number of consumers in each class and to the wide range, in and out of the town, of the public water service.

Geological circumstances do not appear to have determined incidence of the disease. Of the 37 houses invaded, 23 stand on clay and 11 on rock, the other three standing on or near to the boundary line between these formations. The numbers 23 and 11 present much the same relative proportion as do those of the inhabited houses severally standing upon clay and upon rock. The inmates of these houses numbered severally 141 and 73; the numbers of persons between the ages of 1 and 15 years in these houses were 73 and 37, and the numbers of deaths 13 and 7. It may be added that five of the houses, which were first invaded, stand upon rock.



But the schools of the town did on examination appear to have had an influence on the diphtheria prevalence, as the following narrative will show.

In 30 out of the total number (37) of households invaded, the first sufferer was attending school up to the time, or within two days, of falling ill; 14 first sufferers were attending the British School, 12 St. John's, and four St. Mary's. Further, during the earlier periods of the recognized outbreak in the month of October, there were six households invaded. In five instances out of the six the person first attacked was an attendant at the British School for girls and infants. For the rest, they lived far apart and under very different home conditions. The exception referred to was a child in the second household invaded, but this child had freely communicated, almost to the date of falling ill, with the children of the first invaded household. Again in November, 15 households were invaded, 12 of them in the persons of school attendants, five of whom attended the British, five St. John's, and two St. Mary's School. And in December the first sufferer in nine of the 11 households invaded was attending school up to the time, or within two days, of falling ill, viz., four at the British and five at St. John's School.

The disease was, it appears, recognised first among the attendants at the British School, and, if we should allow that it commenced there, there would appear to be no difficulty in explaining its general distribution. There is a very considerable amount of communication between the children attending St. John's and those attending the British School. There is, perhaps, less between the children attending St. Mary's and those attending the British School. As regards other schools, the attendants (none of whom were attacked prior to February 24th, 1886) at the Grammar School, which is in close proximity to the British School, hold but very little communication with the attendants at the latter school; and they are all boys above the age of seven years. And the Walton School, the attendants at which all escaped, is more than a mile away from the British School, and the district from which its attendants gather is peculiarly its own.

Reverting now to the time when the disease first manifested itself among the British School children, the question presents itself as to whether any local cause for diphtheria had arisen there.

I have already shown that this school was in an exceptionally unwholesome condition, and the Medical Officer of Health has regarded this condition as having had causative relation to the outbreak.

But the question of personal infection cannot, I think, be set aside, and for the following reasons. The first sufferer was, as already said, Flory R——. She fell ill on October 18th, while attending the British School, and died October 24th. A child of another household holding communication with the R.'s fell ill on October 27th. One of the mistresses of the British School visited the R.'s on the 28th; she (so I am told) kissed the corpse of Flory, and fell ill of sore-throat on the 30th. This schoolmistress attended as usual to school duties up to the time when she fell ill, and two sisters of Flory, viz., Agnes, aged 10 years, and Annie, aged 7 years, continued to attend the British School up to the 23rd of October. And it was in the persons of children attending this same school that the three next households were invaded; two through children who fell ill on October 31st, and another through a child who fell ill on November 2nd. It is likely enough, therefore, that infection was personally communicated in the school.—And now as to infection of Flory herself. As matter of fact it is known that a girl who contracted diphtheria while out at service in January 1885 returned to her home, only two doors removed from the R.'s, in February of the same year, and that she had a "relapse," which more or less invalidated her until June. Moreover, her brother fell ill of sore-throat very shortly after her return, and others in the house have suffered from sore-throat since. The house and its belongings, it may be added, have not been disinfected. None of this family attended the British School, but intercommunication between its members and the R.'s went on up to the time of Flory's attack. These facts suggest that Flory may possibly have contracted infection from these neighbours, and that she thus introduced it to the British School. If these facts be viewed in the light suggested, always with regard to the faulty conditions, as for instance defective ventilation, under which children of susceptible age were brought together at the British School,



and remembering, too, the free communication between children of the British School and those of St. John's, we may suppose that personal infection had much to do with this prevalence of the disease. And I would add, as regards subsequent occurrences of diphtheria, that in each of the instances in which a household was invaded otherwise than in the person of a child attending school there had been ample opportunity for contracting infection from persons at the time or but a few days previously suffering from the malady.

In connexion with personal infection as having had to do with the epidemic spread of the diphtheria, there arises another consideration of possibly no little importance. It refers to a marked prevalence, at any rate at one of the schools, and antecedent to the diphtheria, of sore-throat, that was seemingly communicable from person to person.

Mrs. Milburn, the head mistress of St. John's National School, informs me that on re-opening school on August 31st, 1885, she noticed an exceptional amount of sore-throat among the children; that a dozen or more were at that time suffering from throat mischief, with, in some instances, a considerable degree of malaise; and that for four to six weeks after the re-opening other children, in all, perhaps, 30 or 40, suffered in like manner. This sore-throat more especially prevailed in the upper schoolroom in which there was last year an average attendance of 103 girls of ages from 7 to 13 years, a few children only in the other rooms (in which there was last year an average attendance of 102 "infants") having been affected. Mrs. Milburn regarded the affection as catching; she herself "took it," and suffered on and off for about three weeks from an "ulcerated sore-mouth, with ulcers all over the roof of the mouth." She informs me that all sign of this affection at St. John's School was lost some days before diphtheria at the British School was heard of. I have been able to obtain but little further information of this sore-throat\*; it did not fall within the cognizance of the medical practitioners, not even in the case of Mrs. Milburn.

The children attending the St. John's School live for the most part on a clay soil; and, it may be added, at the time when sore-throat seems to have commenced there occurred an increase of rainfall and certain other meteorological changes. There is, it appears, at most seasons, and especially in wet seasons, an exceptional amount of sore-throat among those persons who live on the clay soil in and around Aylesbury. But though I went into the matter with some care I failed to find evidence of especial incidence of diphtheria among persons thus circumstanced, except in instances where there was good reason for supposing that genuine diphtheria had been introduced into their homes.

As bearing on possible causes of this September sore-throat, it may be mentioned that during the holidays the children of St. John's School were playing, as usual, very much together on a grass field (now being turned to account for building purposes), and that they had access to, and, it is said, partook of the water from a certain pond in this field. There is also the fact that the filth and silt accumulations from the large catchpits of the new sewers are stored, prior to being put upon the land, on an open space near to several houses in which St. John's School children live.

It deserves notice that in Bierton Road, the road in which most of the St. John's School children live, there was a death from "croup" at the age of three years in February 1885, and further, that two cases of diphtheria occurred at a house near to the school in May 1885. Whether or not mild cases of sore-throat, related on the one hand to these spring cases of diphtheria, and on the other to the infectious throat-illness in September at St. John's School, bridged the interval between the two sets of occurrences, I am not able to say; no information could be got on the subject. It is conceivable of course that virus furnished by these cases of diphtheria barely maintained its life

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\* The veterinary surgeons practising in the district inform me that the only epizootics which have occurred for 12 months past or more in and around Aylesbury have been "pig typhoid" and "strangles in young horses."

under the conditions (meteorological and other) of June, July, and August, but got opportunity of becoming more active about September: subsequently (after gaining in power) becoming introduced into the British School, where under conditions specially favourable to its development it at once manifested lethal properties. But, however this may have been, the chief interest in the recent diphtheria at Aylesbury centres in the September sore-throat among the St. John's School children; and it is matter for regret that the malady did not come under medical observation, as would in due course have happened were School authorities generally charged with the duty of giving prompt information concerning infectious school ailments to the Sanitary Authorities of their districts.

Finally, in regard of the means available at Aylesbury for checking the spread of infectious disease, it requires to be repeated that notification of infectious disease to the Medical Officer of Health is quite without system; that hospital accommodation for isolation of infectious cases is of a merely provisional character; that there is no public disinfecting apparatus; and that there is no public mortuary. The schools were closed for a period of about six weeks from early in January to Mid-February 1886, and it is worth noting that in this period there was apparently but one household heard of as having been newly invaded; and this in the person of a child that had been in frequent personal communication with members of an infected household.

D. ASTLEY GRESSWELL.

29th March 1886.



## RECOMMENDATIONS.

1. The Sanitary Authority should make arrangements whereby each death from zymotic disease (diarrhœa, croup, tonsillitis, quinsy, and sore-throat being included) shall immediately upon registration be notified by the Registrar of Births and Deaths to the Medical Officer of Health.
  2. The Authority should invite prompt notification, on the part of school officers, of disease that may be suspected to be infectious among school children.
  3. Adequate and efficient means for isolation of infectious cases should be provided for the district; and to this end the Local Board might advantageously combine with the Rural Sanitary Authority in making hospital provision. Means for disinfecting bedding and clothing should be provided, as also a mortuary.
  4. The Authority should more vigorously secure the abatement of nuisances in their district and provide against their repetition.
    - a. Houses which owing to dampness, bad ventilation, or other unwholesomeness are a nuisance or in a state injurious to health should not be suffered to be occupied.
    - b. Attention should be at once directed to the many ground surfaces around houses which owing to unwholesomeness are a nuisance or in a state injurious to health. These surfaces should be formed in such a manner and of such materials as to be readily cleansed, and with proper slopes to the drain inlets. Action should be taken under section 36 of the Public Health Act, 1875, in instances in which houses are without ashpits furnished with proper doors and coverings.
    - c. The Authority should provide for more frequent and systematic removal of refuse and excreta from the vicinity of dwellings.
    - d. The Authority should forthwith take measures for the abatement of the nuisances arising from the defective construction, the defective ventilation, and the defective means of flushing of the public sewers and of the private drains. The catchpits in the new sewers should be filled up to a level with the invert.
    - e. Efficient ventilation should be provided for the school rooms. The water-closets at the schools should also be thoroughly ventilated and the closet pans flushed at regular and frequent intervals.
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